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AQUATIC INVERTEBRATES AND HABITAT AT A FIXED STATION ON THE SUN RIVER, CASCADE COUNTY, MONTANA

August 30, 2001

A report to
the Montana Department of Environmental Quality
Helena, Montana

by
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INTRODUCTION

This report is one of 38 brief interpretive summaries of data assembled as part of a statewide, multi-year study conducted by the Montana Department of Environmental Quality (MT DEQ). Each report discusses information generated from a single benthic invertebrate sample collection and habitat evaluation at a fixed station established on a gauged river or high-order tributary. The present treatise focuses on the aquatic community sampled on the Sun River near Sun River, Montana on August 30, 2001. The sample site was located by GPS reading at 47° 32' 50" N, 111° 42' 48" W, lying within the Northwestern Glaciated Plains Ecoregion (Woods et al. 1998). The sample was collected by personnel of MT DEQ. Sampling effort consisted of either a composite of four Hess samples, or a one-minute kicknet collection (Bukantis 1998). Habitat parameters were evaluated using the MT DEQ Macroinvertebrate Habitat Assessment Field Form for streams with riffle/run prevalence. Invertebrate samples were processed and animals identified by Rhithron Associates, Inc. Analysis of invertebrate assemblages was accomplished by applying the method recommended by Bukantis (1998) for streams of Montana's Plains ecoregions. The method uses a multimetric battery to evaluate disturbance to biotic integrity. Results from the application of other metric batteries may be found in the Appendix.

RESULTS AND DISCUSSION

Table 1 itemizes the evaluated habitat parameters and shows the assigned scores for each, as well as the integrated score and condition category.

Overall habitat conditions scored sub-optimally at this site on the Sun River. Benthic substrate diversity was judged sub-optimal; this may have been related to the moderate deposition of sediment perceived by the evaluator. Embeddedness of substrate particles was also observed. Streambanks were judged moderately stable, but some disruption of vegetative cover was noted. The riparian zone width was abbreviated on both sides of the river. Flow conditions were judged adequate.

Table 1. Stream and riparian habitat assessment for a fixed station on the Sun River. August, 2001.

Max. possible score	Parameter	Sun River at Sun River
10	Riffle development	9
10	Benthic substrate	7
20	Embeddedness	12
20	Channel alteration	12
20	Sediment deposition	7
20	Channel flow status	15
20	Bank stability: left / right	8 / 7
20	Bank vegetation: left / right	8 / 4
20	Vegetated zone: left / right	8 / 4
160	Total	101
	Percent of maximum CONDITION*	**63** **SUB-OPTIMAL**

*Condition categories: Optimal (OPT) > 80% of maximum score; Sub-optimal (SUB) ; 75 - 56%; Marginal (MARG) 49 - 29%; Poor <23%. Adapted from Plafkin et al. 1998.

Table 2. Metric values, scores, and bioassessment for a fixed station on the Sun River. The Montana DEQ bioassessment metric battery recommended for streams of the Plains ecoregions (Bukantis 1998) was used for the evaluation. August 2001.

	Sun River at Sun River	
METRICS	**METRIC VALUES**	**METRIC SCORES**
Taxa richness	26	3
EPT richness	12	3
Biotic index	4.83	3
% Dominant taxon	39.13	2
% Collectors	78.26	2
% EPT	67.25	3
Shannon diversity	2.67	2
% Scrapers and Shredders	14.49	1
Predator taxa	4	2
% Multivoltine	25.94	3
	TOTAL SCORE (max.=30)	24
	PERCENT OF MAX.	**80**
	Impairment classification	**SLIGHT**
	USE SUPPORT	**FULL**

Bioassessment results are given in Table 2. When this bioassessment method is applied to these data, scores indicate that this site on the Sun River is slightly impaired but fully supports designated uses. The field investigator notes that the site sampled was located above the Muddy River, so impacts from that source are not reflected in this data.

The biotic index value (4.83) was within expected limits, and the mayfly taxa richness (7) was high, suggesting that water quality at this site was unimpaired by significant nutrient pollution, and water temperatures were not excessively high. The measured water temperature at the time of sampling was 20.7°C.

Taxa collected at the site include the burrowing mayfly *Ephemera simulans*, suggesting that some sandy sediment deposits were available to this creature. Only 8 "clinger" taxa were captured in the sample, but they were very abundant, comprising 76% of animals. This suggests that fine sediments did not completely obliterate hard substrate surfaces.

All expected functional components of a riverine environment in the Montana Plains region were present in the sample. Filter-feeders were the dominant functional component, suggesting that fine organic particulates in suspension were sufficient to support a large population of this group. Scrapers did not appear to be limited by the slight turbidity noted in field observations. Three long-lived taxa made up 18% of the sampled assemblage, implying that catastrophic dewatering has not occurred recently.

CONCLUSIONS

- The taxonomic and functional composition of the benthic assemblage at this site appears to be typical of a healthy riverine environment in the Montana Plains regions.
- Overall community tolerance suggests that water quality is good and temperatures within expectations for the site.
- The bioassessment method employed here appeared to adequately reflect the biotic health of the system at this site.

LITERATURE CITED

Bukantis. R. 1998. Rapid bioassessment macroinvertebrate protocols: Sampling and sample analysis SOP's. Working draft. April 22. 1997. Montana Department of Environmental Quality. Planning Prevention and Assistance Division. Helena. Montana.

Woods. A.J.. Omernik. J. M. Nesser. J.A.. Shelden. J.. and Azevedo. S. H. 1999. Ecoregions of Montana (Color poster with map, descriptive text, summary tables, and photographs) Reston, Virginia. US Geological Survey.

APPENDIX

Taxonomic data and summaries

Sun River

August 2001

Aquatic Invertebrate Taxonomic Data

Site Name: Sun River at Sun River **Date: 8/30/01**

Site ID: M13SUNR01 Approx. percent of sample used: 7

Taxon	Quantity	Percent	HBI	FFG
Dugesia sp.	13	3.77	4	PR
Sphaerium sp.	1	0.29	8	CF
Physidae	1	0.29	8	SC
Total Misc. Taxa	**15**	**4.35**		
Acentrella insignificans	2	0.58	4	CG
Baetis tricaudatus	13	3.77	4	CG
Labiobaetis sp.	5	1.45	4	CG
Fallceon quilleri	1	0.29	5	CG
Ephemera simulans	1	0.29	1	CG
Stenonema sp.	13	3.77	3.5	SC
Tricorythodes minutus	1	0.29	4	CG
Total Ephemeroptera	**36**	**10.43**		
Claassenia sabulosa	3	0.87	3	PR
Total Plecoptera	**3**	**0.87**		
Helicopsyche borealis	4	1.16	3	SC
Cheumatopsyche sp.	48	13.91	5	CF
Hydropsyche sp.	135	39.13	5	CF
Oecetis sp.	6	1.74	8	PR
Total Trichoptera	**193**	**55.94**		
Petrophila sp.	13	3.77	5	SC
Total Lepidoptera	**13**	**3.77**		
Helichus sp.	1	0.29	5	SH
Optioservus sp.	15	4.35	5	SC
Zaitzevia sp.	43	12.46	5	CG
Total Coleoptera	**59**	**17.10**		
Simulium sp.	3	0.87	5	CF
Hexatoma sp.	3	0.87	2	PR
Total Diptera	**6**	**1.74**		
Brillia sp.	1	0.29	4	SH
Micropsectra sp.	9	2.61	4	CG
Microtendipes sp.	6	1.74	6	CF
Polypedilum sp.	2	0.58	6	SH
Tvetenia sp.	2	0.58	5	CG
Total Chironomidae	**20**	**5.80**		
Grand Total	**345**	**100.00**		

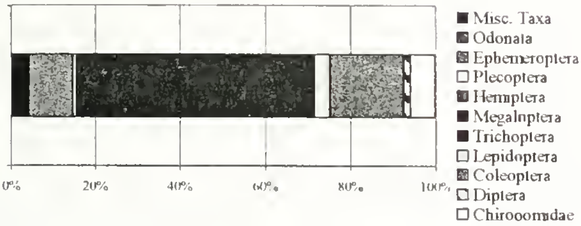
Aquatic Invertebrate Summary

Site Name: Sun River at Sun River **Date: 8/30/01**

SAMPLE TOTAL	345
EPT abundance	232
TAXA RICHNESS	26
Number EPT taxa	12
Percent EPT	67 25

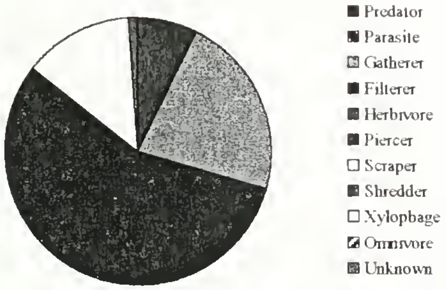
TAXONOMIC COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Misc Taxa	4 35	3	15
Odonata	0 00	0	0
Ephemeroptera	10 43	7	36
Plecoptera	0 87	1	3
Hemiptera	0 00	0	0
Megaloptera	0 00	0	0
Trichoptera	55 94	4	193
Lepidoptera	3 77	1	13
Coleoptera	17 10	3	59
Diptera	1 74	2	6
Chironomidae	5 80	5	20



FUNCTIONAL COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Predator	7.25	4	25
Parasite	0 00	0	0
Gatherer	22 32	9	77
Filterer	55 94	5	193
Herbivore	0 00	0	0
Piercer	0 00	0	0
Scraper	13 33	5	46
Shredder	1 16	3	4
Xylophage	0 00	0	0
Omnivore	0 00	0	0
Unknown	0 00	0	0



COMMUNITY TOLERANCES

Sediment tolerant taxa	3
Percent sediment tolerant	1 45
Sediment sensitive taxa	0
Percent sediment sensitive	0 00
Metals tolerance index (McGuire)	4 20
Cold stenotherm taxa	0
Percent cold stenotherms	0 00

Site ID: M13SUNR01

DOMINANCE

TAXON	ABUNDANCE	PERCENT
Hydropsyche sp	135	39 13
Cheumatopsyche sp	48	13 91
Zaitzevia sp	43	12 46
Optioservus sp	15	4 35
Dugesia sp	13	3 77
SUBTOTAL 5 DOMINANTS	254	73 62
Baetis tricaudatus	13	3 77
Stenonema sp	13	3 77
Petrophila sp	13	3 77
Micropsectra sp	9	2 61
Oecetis sp	6	1 74
TOTAL DOMINANTS	308	89 28

SAPROBITY

Hilsenhoff Biotic Index	4 83

DIVERSITY

Shannon H (loge)	1 85
Shannon H (log2)	2 67
Simpson D	0 17

VOLTINISM

TYPE	ABUNDANCE	PERCENT
Multivoltine	90	25 94
Univoltine	193	55 94
Semivoltine	63	18 12

TAXA CHARACTERS

	#TAXA	ABUNDANCE	PERCENT
Tolerant	10	145	42 03
Intolerant	0	0	0 00
Clinger	8	263	76 23

BIOASSESSMENT INDICES

B-IBI (Karr et al)

METRIC	VALUE		SCORE	
Taxa richness	26		3	
E richness	7		3	
P richness	1		1	
T richness	4		1	
Long-lived	3		3	
Sensitive richness	0		1	
%tolerant	42 03		3	
%predators	7 25		1	
Clinger richness	8		1	
%dominance (3)	65 51		3	
		TOTAL SCORE	20	40 %

MONTANA DEQ METRICS (Bukantis 1998)

METRIC	VALUE	Plains Ecoregions	Valleys and Foothills	Mountain Ecoregions
Taxa richness	26	3	2	2
EPT richness	12	3	1	0
Biotic Index	4 83	3	2	1
%Dominant taxon	39 13	2	2	1
%Collectors	78 26	2	1	1
%EPT	67 25	3	3	2
Shannon Diversity	2 67	2		
%Scrapers +Shredd	14 49	1	1	0
Predator taxa	4	2		
%Multivoltine	25 94	3		
%H of T	94 8		1	
TOTAL SCORES		24	13	7
PERCENT OF MAXIMUM		80 00	54 17	33 33
IMPAIRMENT CLASS		SLIGHT	SLIGHT	MODERATE

Montana DEQ metric batteries